O. W. Oestlund publishes, in the Fourteenth Annual Report of the Geological and Natural History Survey of Minnesota, a list of the Aphididæ of that State, with descriptions of a number of new species.——The Entomological Society of Washington have issued, in a pamphlet of thirty-two pages, the first number of its Proceedings, which contains some interesting notes.

ZOOLOGY.

GEOGRAPHICAL DISTRIBUTION OF PELAGIC MARINE ANIMALS.—Herr C. Chur (*Zool. Anzeiger*, p. 35) ascribes the wide distribution of pelagic forms to four causes; they are of great geological age, and existed long before the elevation of the continents, while the appearance of the latter has given rise to currents which are of great significance in distribution; they are provided with powerful locomotor organs; they or their germs may become attached to powerful swimmers, wood, or the feet of swimming birds; and lastly, they are aided by the wind, for when floating on the water they offer a broad surface.

The author then proceeds to discuss the results of recent observations which confirm the idea just enunciated; as examples of geologically old forms, we may take the Protozoa, and especially the Foraminifera, several of which have been found by Brady to be cosmopolitan in their distribution; the Cetacea and perhaps some Cephalopods are good examples of strongly swimming forms; the cosmopolitanism of many pelagic Crustacea and the localization of Cœlenterata are explained by the resistant chitinous shell of the one, and the delicacy of the tissues of the other set of forms; at the same time, some cœlenterate species are very widely distributed.

INFLUENCE OF HIGH PRESSURES ON ANIMAL TISSUES.—M. P. Regnard has investigated the increase of weight in organs and tissues subjected to high pressures (100–400 atmospheres), and he finds a great increase in the quantity of water in the tissues. It is not yet certain whether this is due to water directly entering, or whether it combines with the albuminoids, and, after the removal of the pressure, escapes and infiltrates the tissues.—*Journ. Roy. Micr. Soc., June, 1886.*

SHELL FORMATION IN BIVALVE MOLLUSKS.—Dr. F. Müller describes the mode of shell formation in Lamellibranchiata. His investigations relate chiefly to Anodonta, Unio and Cyclas, of which chipped-off edges and sections were studied. The decalcification was effected by means of dilute chromic acid; picrocarmine was used for staining, and celloidin was found to be the only satisfactory imbedding material.

The general result of Dr. Müller's research is to corroborate Mathusius in his account of the shell-growth by intussusception and not by secretion. He does not, however, exclude the possi-

bility that apposition of organic elements may occur on the inner surface of the shell, at those places where the shell is permanently united with the body, *i. e.*, from the muscles. The outer margin of the shell, that is the thickened periostæum and the inner surface next the mantle, are always soft. The calcification both of the prismatic and mother-of-pearl layers, is due to small, roundish, irregularly distributed bodies, which gradually increase in all dimensions and become prismatic by mutual pressure.

During the metamorphoses of the young mussel the shell has a fibrillar structure; the lamellation is secondary, probably beginning along with the calcification. The original fibrillar structure is associated with the development and differentiation of the shell-muscles. The organic substance of the shell has a cellular origin.

In their development the fibrils follow the directions of the mantle-muscles. They assume a radial course at the ligament, but elsewhere run parallel to the surface of the mantle, following the direction of the muscle-fibers which run transversely round the animal, just under the epithelium, and which, uniting with the tooth-pad, the pallial line and the periostæum, thus exert influence on the fibrils.

These transverse muscle-fibers aid in the opening of the shell. Those radially disposed on the back of the animal flatten the ligament in contracting, and thus also aid in opening, as those also do which ascend on each side from the foot, and are attached to the tooth or tooth-pad. The muscle-fibers uniting the dorsal muscle insertions on either side, act as adductors. The bundles of cross muscles on the margin of the mantles, which are by one end attached to the shell on the pallial line, and the other to the free portion of the periostæum, effect by their contraction the apposition of the soft-shell margins, and a consequent perfect closure of the shell.—*Journ. Ry. Micr. Soc., June, 1886.*

Mechanism of Opening of the Shell of Mussels.—Dr. J. Panlow has investigated the mechanism of the opening of the shell in *Anodonta cygnæa.* There is a nerve-ganglion 6–8$^{mm.}$ in front of the anterior adductor which gives off several branches. Some of them go to the ganglion on the ventral surface of the posterior adductor. Observations were made by clamping one valve of the shell to a firm board and connecting the other by a silk thread with the short arm of a lever, the longer arm of which works on a slowly rotating drum. An uninjured mussel makes spontaneous movements, the valves being slowly opened a little and closed again more quickly. After separation or irritation of its proper ganglion, each muscle can be studied separately.

The author sums up his conclusions as follows: "Two classes of nerve-fibers supply the adductor muscles—(*a*) motor, causing

contraction, and (*b*) inhibitory, interrupting the contraction and effecting relaxation. The motor nerves of each muscle spring from the nearest ganglion; but all the inhibitory fibers originate in the anterior ganglia. The latter pass to the anterior adductor by the short nerve-branches which pass to it from the anterior ganglia. They reach the posterior muscle through the connectives. The posterior ganglion thus functions as motor center for the posterior adductor; and the anterior ganglia act similarly on the anterior adductor. The motor cells of the ganglia on either side may be stimulated to activity, either by peripheral nerve-fibers (of the mantle or gills) or by certain fibers of the connectives. The anterior ganglia are able to produce relaxation in either anterior or posterior adductors."

ABYSSAL DECAPOD CRUSTACEA OF THE NORTH ATLANTIC.—Professor S. J. Smith reports in the *Annals and Magazine of Natural History* (1886, 187) on the species collected by the *Albatross.*

Altogether 130 species were taken, but only forty-four were found at depths below 1000 fathoms. The first question which arises is, which of these actually inhabited the bottom? Fifteen of them—that is the two Brachyura, the seven Anomura, the Eryontids, Crangonids and Glyphocrangonidæ among the Macrura—are unquestionably inhabitants of the bottom. It is doubtful whether those that are here grouped together as Miersiidæ are deep-dwellers; they are among the most common characteristic forms taken in trawling at great depths, while the structure, *e. g.*, the highly developed black eyes, the comparatively *small* eggs, and the firm integument of *Acanthephyra agassizii* and *A. eximia* are some evidence that they do not normally inhabit the bottom. Pasiphaë and Parapasiphaë seem to be abyssal species, but to be free-swimming; the eight species of Penæidæ which are in the list are undoubtedly free-swimming forms not confined to the immediate region of the bottom, but their relatively small eyes and well-developed ocular papillæ indicate that they are deep-water if not abyssal species.

The author provisionally groups the species into four classes: 1. Species inhabiting the bottom or its immediate neighborhood. 2. Species probably not confined to the immediate neighborhood of the bottom, but showing structural evidence of inhabiting abyssal depths. 3. Doubtful, but probably inhabiting abyssal depths. 4. Species probably not inhabiting abyssal depths.

Many of the species are remarkable for their large size, and there are none that are very small; many are large members of, or even giants, in the families to which they belong. The color of the abyssal Decapoda is very characteristic; a few species are nearly colorless, but most are of some shade of red or orange; bright markings were not seen in any species from below 1000 fathoms. The structure of the eyes is of the highest interest, and

worthy of the most minute and careful investigation, but Mr. Smith has not yet been able to make it. He gives, however, the results of a "superficial examination of the external characters of the eyes." The simplest and most direct form of the tendency to modification is seen in the gradual reduction in the number of the visual elements. Sometimes the eyes are highly modified (as in Pentacheles), and here all the species have probably been long inhabitants of deep water; when the eyes are less modified, or obsolescent, the species are much more closely allied to shallow-water forms. Many Decapods have the eggs large in size and small in number, but this is not true of all; when the eggs are large, development is, as in *Bythocaris leucopis*, abbreviated.

THE MOST SOUTHERN SALMON.—I owe to my friend, Professor Lupton, two specimens of a black-spotted trout from a locality far south of any which has hitherto yielded Salmonidæ. They are from streams of the Sierra Madre, of Mexico, at an elevation of between 7000 and 8000 feet, in the southern part of the State of Chihuahua, near the boundaries of Durango and Sinaloa. The specimens are young, and have teeth on the basihyal bones, as in *Salmo purpuratus*, which they otherwise resemble.—*E. D. Cope.*

THE HABITS OF EUBLEPHARIS VARIEGATUS BAIRD.—This very pretty lizard is the only species of the Eublepharidæ thus far found in the United States. Only one other species of that family is found in America, the *Coleonyx elegans* of Mexico and Central America. I found the former rather abundantly in the rocky hills of the first plateau northwest of San Antonio, in Texas, but did not observe it in that region north of that point either on the Guadalupe or Llano. It is found in holes under stones, towards evening, and generally in pairs, a peculiarity I have not observed in any other lizard. Its manners are also peculiar. It carries its thick tail coiled vertically on one side of its back like the spitz dog. Its movements are quick but feeble, and its short legs forbid the speed of other lizards. Coleonyx is one of the few genera of Gecconidæ which have eyelids, and as these are thick, and their movement in winking is slower than in other lizards, the physiognomy is quite peculiar. When handled, this species chirrups and squeals feebly like a singing mouse. One specimen which I took was about to shed its skin, so I placed it in a jar to observe the process. This took place in the night, for next morning it was so clean and its color so bright, that it looked as though gotten up for some special occasion. As no trace of the skin could be found, I suppose that it ate it, after the manner of the Batrachia. In life, the colors are very elegant; the pale cross-bands are citron-yellow, and the brown ones bright chestnut. The inferior surfaces and all parts of the limbs are flesh or rose color.

A specimen recently sent to the Smithsonian Institution licks

the end of its nose with its tongue like a dog. Respiration is carried on by means of both the intercostal and hyoid muscles.—*E. D. Cope.*

THE SENSE ORGAN IN THE PINEAL GLAND.—The suggestion of Ahlborn and Rabl. Ruckard that the pineal gland is the remnant of some organ of special sense present in some primitive Vertebrata,[1] has received confirmation from the studies of Von Graaf and Spencer. The former finds a rudimental organ of sense in this part of the brain of the slowworm-lizard (*Anguis fragilis*), and the latter, who works in the biological laboratory of the University of Oxford, finds a similar organ in the *Sphenodon punctatus*. The organ includes a lense, and is of the invertebrate type, *i. e.*, the rods are turned towards the light and not away from it.

These observations render it probable that certain extinct relations of Sphenodon, the saurians of the family Diadectidæ (order Theromorpha) of the Permian epoch of North America, had this pineal sense-organ highly developed. The frontoparietal fontanelle is larger than in any other reptiles, and the cast of the surrounding regions shows various peculiarities (see Proc. Amer. Phil. Soc., 1885, p. 236).

THE VERTEBRÆ OF SPHENODON.—In the May number of the AMERICAN NATURALIST (p. 466) Dr. G. Baur mentions that "nobody will find the separate part of ossification of the prezygapophyses in the cervical vertebræ of Sphenodon," the figures of which I gave in my work, Fauna der Gaskohle, Tab. 70.

To facilitate the understanding of my drawing, I gave the exact dimensions of the object carefully drawn with the camera lucida. The seven cervical vertebræ are 27^{mm} long, and on the third, fourth and fifth the ossification on the tip of the prezygapophysis[2] is clearly seen.

The object is in the zoological cabinet of the Boh. University at Prague, and can be shown to any scientific man.

In regard to the question whether that is an equivalent of the pleurocentrum or not, I gave on p. 52 my opinion with caution as a probable way to explain the difficult question: What has become of the pleurocentrum in Sphenodon?—*Dr. Anton Fritsch, Prague, Bohemia, June, 1886.*

THE RATTLESNAKE IN NEW ENGLAND.—The following notes on the recent occurrence of rattlesnakes in Southern New England, are inserted in order to call out notes and information from others as to the occurrence of this reptile at or near its northern limits of distribution. We have been told that rattlesnakes are still occasionally killed in Connecticut near the Rhode Island border.

[1] See remarks on the possible monoculous character of *Bothriolepis canadensis*. NATURALIST, 1885, p. 291.

[2] The thorax of the specimen being 125^{mm}.

It is generally stated that the last rattlesnake was killed in Rhode Island twenty years ago, but we are informed by Professor Battey that one was killed at Tiverton, R. I., within a period of four years. Its skin is now in the museum of the Friends' School, at Providence. Mr. Henry H. Buxton, a member of this school, from Peabody, Mass., gives us the following statement regarding its occurrence at that locality:

"In South Peabody there is a rock called Rattlesnake rock, surrounded by woods in which there are a great many snakes, including the rattlesnake. During the last year three or four have been killed by different persons. They confine themselves to the part of the town which is the most rocky and slightly elevated. In the winter they get under this rock and go to sleep. One man who lives in the vicinity found one on his door step sunning himself. He says money wouldn't hire him to go near the rock during the summer. George Foster, the son of Gen. Foster, of Revolutionary fame, bought one to keep as a pet, but one night when he came home he went to get a match, but instead of a match he got a bite. He happened to be full of liquor at that time, so it did not kill him. Last summer one was killed with eleven rattles. It is very unsafe for anybody to go into the woods in this part of the town in the summer, especially when berries are ripe. The snakes are about the color of the ground and sticks, and a person gets right onto them before he is aware of it." Rattlesnakes are still common in the Milton hills, near Boston, and at Hyde park.—*A. S. Packard.*

Zoological News.—*General.*—A Natural History Society has been founded at Yokohama. At the first meeting, in April of the present year, Professor Milne spoke of the difference between the fauna of Yezo and that of the other Japanese islands. In Japan they have the monkey, the sheep-faced antelope, the bear and the pheasant, while on the other side of the straits there is neither monkey, pheasant nor antelope, and the bear is a different species.——M. H. de Varign (*Revue Scientifique*, April 3d,) details the result of experimental researches upon the muscular contraction of invertebrates. The graphic method was employed, and Crustacea, mollusks and echinoderms were submitted to examination. The variations observed in the latent period, whether in smooth or striated muscle, proved to be of the same kind and to be subject to the same influences as those of vertebrate muscles. The form of contraction follows the same rule as the latent period, its duration in the Crustacea and the scorpion is in some cases even shorter than in vertebrates, but in Dromia and Maia it is relatively slow, and very slow in Rhizostoma. A short latent period is followed by a short contraction. Tetanus, normal and rhythmic, the paradox of Weber, and other muscular conditions were studied and the general result was to prove that there

is not the fundamental difference between smooth and striated muscles in the invertebrates that has been attributed to the two forms in the vertebrates. The smooth, voluntary muscles offer every intermediate phase of duration of contraction.

Worms.—The thesis by which M. Francois obtained the degree of doctor of natural sciences was entitled "A contribution to the knowledge of the nervous system of the Hirudinea." The nerves connecting the ganglia have in Branchellion a neurilemma and three nervous cords, and there is no trace of a medullary canal. The cellules of the ganglia are arranged in six follicules, and occupy the inferior and lateral regions of each ganglion, two ventral and four lateral.——Adam Sedgwick contributes to the February issue of the *Quart. Jour. Mic. Science* an article upon the development of the Cape species of Peripatus. The segmentation is apparently complete, and the endoderm cells come at first without a distinct nucleus.

Molluscа.—The appendages of the female organ of reproduction in the gasteropods are usually distinct and placed along the line of the oviduct, but in Doris they are united into a single mass. This is difficult to dissect, but by taking advantage of the spawning period, M. E. Bolot has been able to identify the different points of the gland where the eggs receive the accessory parts necessary to their perfection.

Fishes.—S. E. Meek and R. Newland (Proc. Acad. Nat. Sci. Phil.) give a review of the genus Esox. They allow five species, viz: *Americanus*, *vermiculatus*, *reticulatus*, *lucius*, and *masquinongi*. The same authors review the genus Scorpæna, of which they allow eleven species, all except two of which are American.

Reptiles.—W. Baldwin Spencer (*Nature*, May 13) describes a curious organ which he characterizes as "the parietal eye of Hatteria," an eye which is originally part of the epiphysis. The epiphysis, which seems to arise as a hollow outgrowth from the roof of the third ventricle, becomes in both reptiles and Amphibia divided into two parts, a proximal one remaining in connection with the brain, and a distal, bladder-shaped structure, the two in most cases becoming completely separated. In *Anguis fragilis* this distal part develops into a structure resembling a highly-organized invertebrate eye, but without a nerve. In Hatteria this portion forms an eye with capsule and lens as in Anguis, but a nerve is present also. The organ, deeply embedded in connective tissue, is now useless. Iguana, *Chameleo vulgaris* and *Lacerta ocellata*, have a similar parietal eye.

Birds.—Those interested in the migrations of birds should refer to the series of articles by M. Oustalet in recent issues of the *Revue Scientifique*.——Professor R. Collett recently communicated to the Zoölogical Society of London an account of a hybrid which occasionally exists between the willow grouse (*Lagopus albus*)

and the black grouse (*Tetrao tetrix*). Most of the thirteen specimens examined were males.

Mammals.—Mr. Frederick True, in a letter to *Science*, asserts that he has found characters by which *Lynx canadensis* can be distinguished from *L. rufus* and the other Southern varieties. Examination of over sixty skulls showed that in all examples of *L. canadensis* the anterior condyloid foramen is *not* confluent with the foramen lacerum posterium, and that the visible portion of the presphenoid is flask-shaped, the convexity in front. In *L. rufus*, *maculatus* and *fasciatus* the two foramina are confluent as in the cats generally, and the visible part of the presphenoid is sagittate or linear. Mr. True, therefore, believes that there are two species of American lynxes, and that the confluence of the condyloid and lacerated foramina cannot in future be regarded as a distinguishing character of the Æluroidea.——Walter Heape (*Quart. Jour. Mic. Science*, Feb., 1886) contributes an article upon the development of the mole (*Talpa europea*), the ovarian ovum and the segmentation of the ovum. The epiblast of the vesicle and of the embryo is formed from the whole of the outer layer and by far the largest proportion of the inner mass of segments. The hypoblast is formed from the small remaining portion of the inner mass, and the mesoblast, subsequently, from both epiblast and hypoblast layers. Thus the division of the segmentation spheres, by Beneden, into epi- and hypoblast spheres from the time when the two first segments were formed, is incorrect.——Dr. O. Finsch has recently described a new species of wild pig (*Sus niger*) from New Guinea.

EMBRYOLOGY.[1]

The Metamorphosis of the American Lobster, Homarus americanus H. Milne-Edwards. — The changes which the young lobster undergoes during the first six or seven weeks of its free existence, as a pelagic organism, constitute a veritable metamorphosis, which is apparently accomplished in the course of six ecdyses, or changes of the exoskeletal investment of the body. These molts, or ecdyses, occur at intervals of from four to fifteen or more days, if the larvæ are well fed. At each ecdysis a complete renewal of the exoskeleton occurs; the old cast skin being quite thin and transparent up to the fifth ecdysis, and retains the form of the body at the time of molting. The old skin is ruptured along the median dorsal line of the cephalothorax and at the point where the latter joins the abdomen; the tail is withdrawn after the head.

Inasmuch as some Arthropods undergo an ecdysis within the egg, the advanced eggs of the lobster have been carefully examined to determine whether a molt took place at the time of

[1] Edited by John A. Ryder, Smithsonian Institution, Washington, D. C.